

M72/3 –Weekly Report No. 5: 13 -19 April 2007

On Friday April 13 a last comprehensive sampling program along the Georgian continental margin was run during this cruise. It started at Pechori Mound just after the seismic work was completed. The first instrument used was the minicorer, which we first ran at Colkhети and Batumi Seeps to sample the uppermost 40 cm of the sediments. Detailed pore water profiles will help to calculate the diffusion rates of the fluids. Long sediment cores were taken by the gravity corer and the autoclave piston corer within the area of the seeps. They recovered gas hydrate samples in high quality.

The second part of the expedition was planned to investigate areas in Turkish and Georgian waters of the Black Sea. We consequently sailed in the direction of Andrusov Ridge on Friday evening. The ridge is a geological structure at depth and separates the western basin from the eastern Black Sea basin. It is, however not visible in the modern morphology of the sea floor. The ridge is running along a line between Samsun in Turkey and Yalta on the southern coast of Crimea. Indications in seismic sections for the rise of gas from deep levels caused us to explore some potential seep sites on the sea floor by a small survey program. The goal was to find a gas hydrate location deeper as 2000 m water depth. Seismic and swath bathymetry profiles run during the night made clear that we would need more time to explore the area in order to find seep sites. This, however, would have shortened our working program in the Sorokin Trough, Ukraine. Therefore, we decided to continue sailing in a northwestern direction to reach Ukrainian waters.

On Sunday afternoon we reached the Sorokin Trough area, where we first planned to combine a sidescan sonar survey together with a multichannel seismic measurement over Dvurechenskii mud volcano. Since there was an increase in wind speed up to Beaufort 6 within a short time of only 2 hours, we had to cancel the sidescan sonar deployment and had to run alone the seismic lines. In contrast to previous seismic profiles these seismic records document very interesting details of the inner structure of the mud volcano. The following day, April 16 was again dedicated to an extensive sediment sampling program on top of two mud volcanos. After this working program was successfully finished we moved to the eastern Sorokin Trough south of the Kerch Peninsula. This area is characterized by a buried deep-sea fan that developed from sediment discharge from the north through Kerch Strait.



Figure 1: Besides sediment and gas hydrate sampling geophysical tools became more important during the second leg of cruise M72/3. Launching of the 600m-long streamer to perform multichannel seismic investigations (left) and Sidescan Sonar DTS with the depressor in the front just before deployment from the working deck (right image).

Measurements from our Ukrainian colleagues from Sevastopol showed that many gas flares exist on the shelf clustering particularly at the shelf edge. The important question is, whether

this is a shelf phenomenon or whether gas expulsion sites do also occur at the continental slope, where they should lead to the presence of gas hydrate in the near-surface sediments. To date there is no information on the presence of gas hydrates in this area. A first survey using the hull-mounted sonar systems of RV METEOR and seismic profiling found evidence for gas expulsion. Gas flares were found in varying numbers and densities along the entire continental slope above 750-m water depth. A maximum of flare activity occurred in the western part. In order to tackle our gas hydrate questions we were mainly interested in finding flares along the deeper parts of the slope below 750-m water depth. In the night from Wednesday April 18 to Thursday, April 19 a flare of more than 400-m height above the sea floor was found in 900-m water depth.

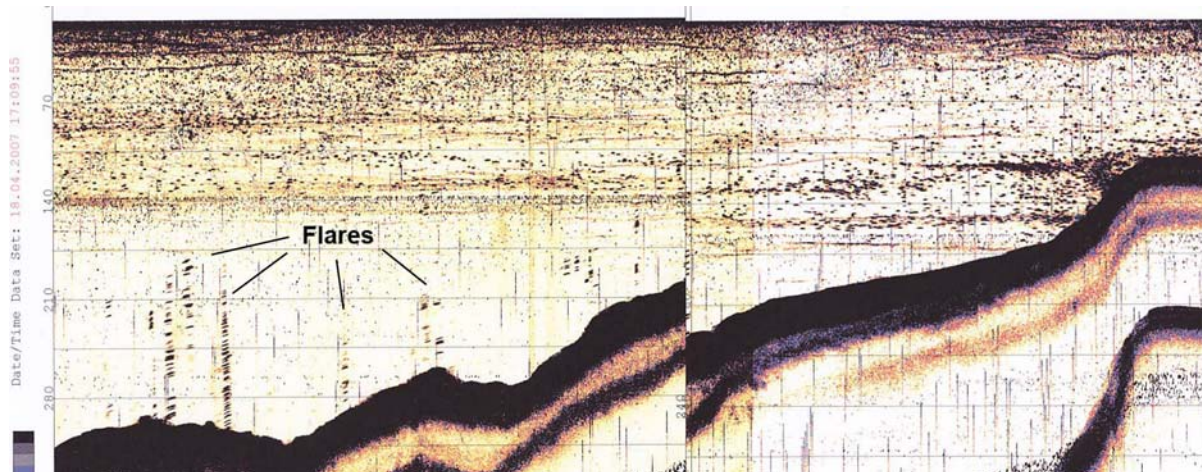


Figure 2: Parasound record of the 18 kHz signal from the upper continental slope to the shelf edge south of Kerch Strait. The seafloor is indicated by a broad and dark stripe (note the offset of nearly 40-m in the center of the record). Gas flares (active bubble streams from the sea floor) are indicated on the left side in the water column. Distinct pattern in the water column above and below 140-m water depth document the clear separation between oxygen-rich water above where many animals live and anoxic water below.

This location which we called Kerch Flare lies certainly within the gas hydrate stability field, so that methane hydrates can form in the sediments. A first attempt at sampling gas hydrates using the gravity corer was not successful, which can be explained by a non-homogenous distribution of gas hydrates at the seep site. We will test this tomorrow and will attempt further sampling. The night from Thursday to Friday was dedicated to investigate the flare in more detail, as well as other potential flare locations, and to explore the geology of the seabed. We will report on the results of the upcoming attempts at sampling Kerch Flare and the other events of the final week of the cruise in the next and final weekly report.

With best regards from all participants of Meteor M72/3

Gerhard Bohrmann

FS METEOR, 19 April 2007